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Children's comprehension of deceptive points

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This study investigated children's ability to comprehend deceptive point gestures. Thirty 3–4½-year-olds participated in a game in which a sticker was hidden under one of two containers. A confederate provided misleading clues about the location of the sticker by either pointing to or placing a marker on the container without the sticker. Across ages, children performed less well when the clue was the point than when it was the marker. They were able to use the misleading marker cue, learning to look under the unmarked container. However, they could not do this for the misleading point. These results concur with those from studies of point production (Carlson, Moses & Hix, 1998) in indicating that deceptive pointing may be a misleading measure of children's abilities. At a very early age children learn the communicative value of the point gesture. This knowledge may become so entrenched that children have difficulty interpreting points in a novel manner.

A challenge facing developmental psychologists is finding behaviours to index children's underlying knowledge. This issue has come to the foreground in research on children's theories of mind. Finding problems with the classic 'Maxi' task (Wimmer & Perner, 1983), several researchers have argued that children's ability to deceive another person may be a more sensitive indicator of whether children understand false beliefs (e.g. Chandler, Fritz & Hala, 1989; Hala, Chandler & Fritz, 1991; Russell, Mauthner, Sharpe & Tidswell, 1991; Sullivan & Winner, 1993). By deceiving, the argument goes, a child deliberately tries to make another person think something that is not true, thereby showing a tacit understanding of false beliefs. However, researchers disagree on the age at which children can first deceive. Some report that children as young as 2½ years of age employ deceptive strategies (Chandler *et al.*, 1989). In contrast, others have found that young preschoolers fail to deceive opponents, even when strongly motivated to do so. Russell *et al.* (1991) presented children with a game in which chocolate was hidden in one of two boxes. The boxes had windows allowing the children to see which box contained the chocolate. The windows were positioned so that their opponent could not see into the box. Children were instructed to indicate the box they wanted the opponent to take. They would get to keep what was in the other box. Thus, in order to win the chocolate, children had to point to the empty box. Three-year-olds pointed to the baited box at the start of

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the game, and continued to do so throughout the 20 trials, even though they continually lost the chocolate by doing so (see also Peskin, 1992; Sodian, 1991).

Carlson, Moses & Hix (1998) noted that, in general, studies that find failures to deceive require children to point deceptively, whereas studies that find early success at deception use other, novel behaviours. They suggested that young children's failure at pointing deceptively might be because of a lack of inhibitory control: children have much experience pointing to objects of interest and this may set up a response bias that interferes with deceptive points. Because novel behaviours do not have this history, children may be better able to use them to deceive. To test this possibility, Carlson *et al.* engaged preschoolers in a game of deception like the one used by Russell *et al.* In one condition, children were instructed to point to the box they wanted the opponent to choose. In another condition, children could deceive their opponent by placing a picture on the box. Three-year-olds were able to deceive using the picture, but could not do so using a point. Carlson *et al.* concluded that young children's inability to produce deceptive points is like other failures to inhibit a primed behaviour, for example, being unable switch to sorting based on colour after having repeated trials of sorting based on shape.

The point gesture may pose additional problems for young deceivers. Pointing is unlike sorting by colours in one important respect: it is a conventional communicative gesture. Pointing works as a conventional gesture because speakers agree on its function. People use points to direct the attention of their interlocutors to objects and locations. By the time babies are 18 months of age, they are adept at both using and interpreting points in this way (Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; Butterworth & Grover, 1988; Desrochers, Morissette, & Ricard, 1995; Franco & Butterworth, 1996; Schaffer, 1984). Indeed, Butterworth (1995) has argued that pointing has special status beyond its conventional usage: pointing is argued to be a species-specific communicative behaviour that emerges early in development both in production and comprehension. Thus, in addition to a history of performing points in certain ways, children may also have expectations about this gesture as a communicative tool that could interfere with its use in deception tasks.

To investigate this possibility, the present authors modified the task developed by Russell *et al.* (1991) and Carlson *et al.* (1998) to test children's comprehension of deceptive points. The child's task was to find a hidden sticker based on a misleading hint. On some trials, the misleading hint was a point. On other trials, the misleading hint involved the use of a marker. For both kinds of trials, the logic of the problem was the same. The only difference was the form of the deceptive hint. Because children's ability to understand deception depends in part on understanding false beliefs, and because there are developments in false belief understanding between 3 and 4 years of age, children were tested at three ages: young 3-year-olds, older 3-year-olds, and young 4-year-olds.

Method

Participants

Thirty children participated in the study. There were five males and five females in each of three age groups: young 3-year-olds (mean age = 3;3, range = 3;0–3;5); old 3-year-olds (mean age = 3;8, range = 3;6–3;10); and young 4-year-olds (mean age = 4;3, range = 4;0–4;6). Two additional children, one

in the youngest age group and one in the oldest age group, began the game but did not complete all trials. They were not included in the final sample of 30.

Procedure

Children were tested individually in a laboratory room equipped with a table, chairs and a video camera. The child sat at the table with his or her parent to the left and an experimenter (E1) to the right. A second experimenter (E2), the confederate, sat across from the child. There were two opaque bowls placed upside-down on the table. E1 explained that E2 would hide a sticker under one of the bowls, and then give a hint about where to find it. Children were told that if they found the sticker, they could keep it, but if they did not find it E2 would keep it. The child and E2 were each given a picture to decorate with the stickers. E1 encouraged the child by saying, 'Let's see who can finish their picture first.'

Each child was given 10 trials in which the hint was a point and 10 trials in which the hint was a marker placed on one of the two bowls. Five of the children in each of the two younger age groups and six children in the oldest age group had the point trials first. At the start of each trial, E1 moved a cardboard screen into place between the child and the bowls. E2 then hid a sticker under one of the bowls. The placement of the sticker was randomly assigned for each trial. A cloth under the bowls prevented the child from hearing which bowl was moved. E1 then removed the screen and asked E2 to give the hint. On point trials, he pointed toward the empty bowl. On marker trials, he placed a marker on top of the empty bowl. The marker was a flattened ball made of yellow netting material. E1 next asked the child to find the sticker. If the child searched under the empty container for three consecutive trials, E1 gave him or her a sticker between trials to keep him or her from becoming distressed. At this point E1 also gave the child a hint, remarking on how 'tricky' E2 was. The child's response was scored as the first container that he or she lifted or touched after E1's query. These responses were scored from videotape with one exception: one parent declined to be videotaped. This session was scored online by E2.

Results

Figure 1 summarizes children's performance on the two kinds of trials. Preliminary analyses revealed that the type of trial given first (point vs. marker) did not affect the overall pattern of findings. Therefore, the data were collapsed across this dimension in subsequent analyses. For each child, the average number correct on each block of two trials (for a total of five consecutive blocks for each cue) was calculated. An analysis of variance with age group (3;3, 3;8, 4;3) and sex as between-subjects factors and cue type (point vs. marker) and block (1–5) as within-subjects factors was conducted. This analysis revealed a main effect of Cue Type ($F(1,24) = 26.50, p < .0001$): children were more successful at finding the sticker on marker trials than on point trials (M(marker) = .73, SE = .05; M(point) = .42, SE = .07). There was also a main effect of Block ($F(4,96) = 15.40, p < .0001$), indicating that performance improved from the beginning to the end of the session (the means (and standard errors) for blocks 1–5 were .36(.04), .55(.07), .63(.07), .66(.07), .68(.07)). In addition, there was a main effect of Sex ($F(1,24) = 5.34, p < .05$), indicating that girls performed better than boys (M(girls) = .68, SE = .07; M(boys) = .48, SE = .08). Finally, there was a main effect of Age Group ($F(2,24) = 5.30, p < .05$; M(3;3) = .39, SE = .07; M(3;8) = .63, SE = .11; M(4;3) = .72, SE = .07). *Post hoc* comparisons revealed that the only reliable difference was between the youngest age group and the oldest ($p < .05$, with the Bonferroni–Dunn adjustment). The discrepancy between point and marker trials did not vary as a function of trial number, age group or sex: there were no reliable interactions.

The authors next asked whether children could find the sticker reliably on point and marker trials. To do this, they compared children's performance to chance (50%) rates.

Below chance performance would indicate that children were fooled by the misleading cue, and above chance performance would indicate that children had figured out the misleading cue. Because children's performance improved across trials, these analyses were conducted separately for the first two blocks (trials 1–4) and the last two blocks (trials 7–10). Table 1 summarizes the results of these analyses. On the first two blocks of point trials, the youngest age group chose the empty container systematically. By the end of the session, their performance was random on these trials. For marker trials, in contrast, the youngest group chose randomly on the first two blocks, and then chose the correct container at above chance rates on the final two blocks. Children in the older two age groups chose randomly across blocks when given a point cue. When the cue was the marker, in contrast, children at these ages chose correctly at above chance or marginally above chance rates across blocks.

The data summarized in Table 1 indicate that even in the first four trials, children performed better when the cue was a marker than when it was a point. This raises the possibility that children may have differed in their initial reactions to the two cues. To explore this possibility, the number of children were counted in each group who chose correctly versus incorrectly on the first marker trial and the first point trial. The question was whether children differed in their initial responses to the point and marker cues. The

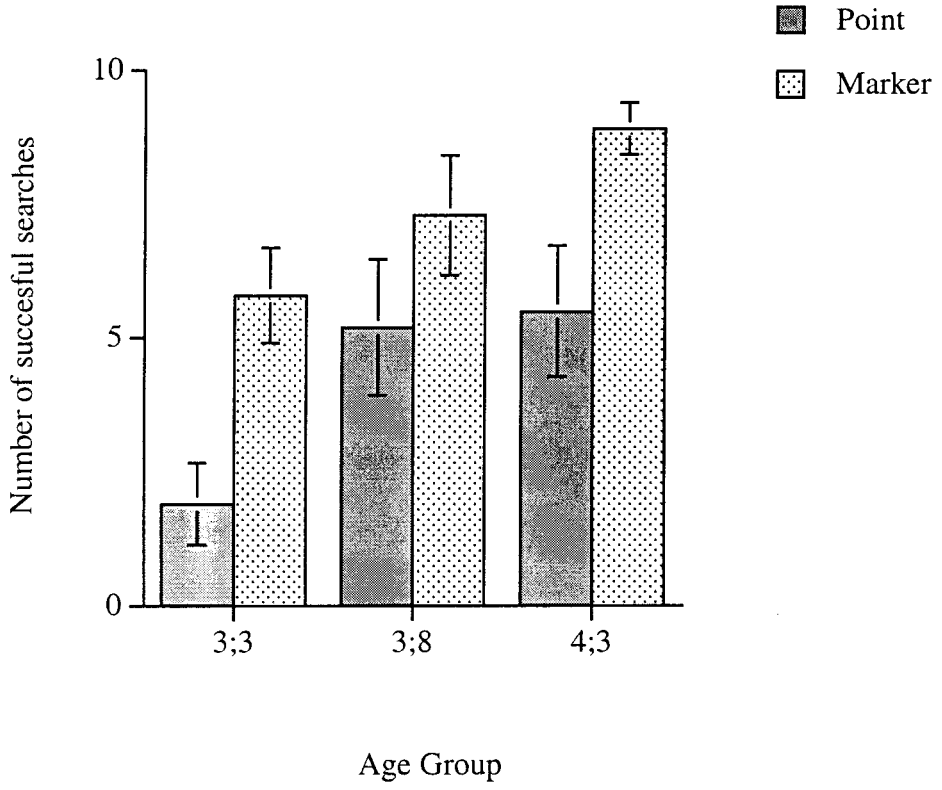

Figure 1. Mean number of trials (of 10) on which children found the sticker (bars indicate standard errors of the mean)

Table 1. Mean proportion of correct responses for the first two and last two blocks of trials for children in each age group (standard errors in parentheses)

		Trials	
Age group	Cue type	1–4	7–10
3;3	Point	.08 (.04)**	.30 (.12)
	Marker	.33 (.10)	.78 (.12)**
3;8	Point	.40 (.11)	.60 (.15)
	Marker	.73 (.11)*	.75 (.13)*
4;3	Point	.40 (.13)	.65 (.15)
	Marker	.80 (.06)**	.95 (.05)**

* Marginally different from chance (.50) $p < .10$.

** Different from chance (.50) $p < .05$.

answer to this question varied as a function of age. For two of the age groups, the 3;3 and 4;3 groups, children's response to the first marker trial did not differ from their response to the first point trial. The youngest group systematically chose the empty container for both trials: 9 of the 10 children showed this pattern for each of the trials; this was below chance, $p < .05$ by sign test. The oldest group was randomly distributed in their responses on both trials: three children chose correctly on the first point trial, $p = .34$ by sign test, and six did so on the first marker trial, $p = .75$ by sign test: the number of correct versus incorrect responses did not differ between the first point trial and first marker trial, $p = .34$ by Fisher exact test. In contrast, the 3;8 group responded differently on the first marker and point trials. None of the children chose correctly on the first point trial, $p < .005$ by sign test, but six of the children did so on the first marker trial, $p = .75$ by sign test: the number of correct vs. incorrect responses on the first point and marker trials differed reliably, $p = .01$ by Fisher exact test. Thus, for this age group, the marker may have been a less misleading cue than the point from the outset.

Conclusion

For both the marker and point trials, the task was to avoid the container indicated by E2. Children could solve this problem when the misleading cue was a marker, but they could not do so when the misleading cue was a point. Even the oldest children did not perform better than chance on point trials, although even the youngest children were above chance on marker trials by the end of the session. Thus, children's difficulties with points as deceptive cues extend to points produced by other people. A recent study by Lee, Eskritt, Symons & Muir (1998) provides further evidence that pointing has a particularly strong effect on young children's responses. In their task, 3-year-olds saw videotaped events in which an actor pointed toward one object but looked toward another. When asked which object the actor wanted, the 3-year-olds consistently chose the object the actor pointed toward, and persisted in doing this even when told that they should not use the pointing cue.

Carlson *et al.* (1998) propose that children fail to produce deceptive points because of their own history of action. The present findings indicate that the problem with points in deception tasks is more complex than this. Children have expectations about the gestural form that interfere with their ability to understand it, as well as use it, as a misleading cue. Procedures which require children to point deceptively may thus pose two problems for children—the need to inhibit a strong response bias, and the need to use a well-established communicative tool in an unusual way. Comprehension tasks like the one used here may be less demanding than production tasks in that they pose the latter demand but not the former. This possibility is supported by Shultz & Cloghesy's (1981) finding that children learn to interpret deceptive points more readily than they learn to produce them. Shultz & Cloghesy engaged 3-, 5-, 7- and 9-year-olds in a card game in which deceptive pointing was a strategy for winning the game. Sometimes children played the role of 'pointer'. In this role, they could win by pointing deceptively. Other times, children played the role of guesser. In this role, they were sometimes required to respond to a deceptive point produced by their opponent. Three-year-olds found both roles very difficult. Five- through 9-year-olds did somewhat better. Across ages, children won more often in the guesser role than in the pointer role.

The present study tested children at three ages to determine whether there were age-related differences in children's responses to the two deceptive cues. Both similarities and differences were found across ages. There was no significant variation in overall performance as a function of age. Children at all three ages performed less well on point trials than on marker trials. At the end of the session, all three groups performed at above chance or nearly above chance rates for the marker, and all were at chance in their responses to the point. However, the analyses of the first trial for each cue indicate potential differences between the age groups that should be explored in further studies. First, whereas the youngest children were fooled on the first trial for both the marker and the point, the oldest children responded randomly as a group on the first trial for each of these cues. Perhaps something in the situation led some of the oldest children to consider the possibility that E2 was being deceptive. Even so, this suspicion did not enable them to learn how to win the sticker systematically for points. Secondly, the middle age group, 3;8, responded to the point as the youngest children did, but to the marker the way the oldest children did. They chose the indicated (empty) container for the former and chose at chance for the latter. Perhaps, then, children begin to consider the possibility of deception for some kinds of actions before others. Verifying these patterns and establishing how they relate to the child's understanding of deception is an important task for future work.

These questions aside, the current findings lend further support to the argument that deceptive pointing may not accurately reflect children's abilities. More generally, they suggest that even the most natural seeming behaviours may be problematic indexes of children's underlying knowledge.

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